

U.S. Serial No. 10,663,728
Amendment
Reply to OA dated Nov. 30, 2004

Atty. Doct et No. 740165-362

REMARKS

The rejection of claims 1-10 under 35 U.S.C. § 102(b) and 103 has been obviated by revising independent claim 1 so that it more clearly distinguishes the invention from the prior art of record. However, before the specific language of the Amendment is discussed, a brief recap of the principal features and advantages of the invention will be made so that the language used in the Amendment may be more fully appreciated.

Generally speaking, the invention is an electro-chromic reflecting mirror particularly adapted for use in automobiles, wherein the reflecting film layer serves the dual function of both acting as a mirror, and storing the hydrogen ions which are used to vary the color of the electro-chromic covering film when it is desired to darken the mirror. By contrast, in the prior art (as described in detail on pages 2 and 3 of the specification) a separate oxidation coloring film was used to store the hydrogen ions used to selectively color the electro-chromic coloring film. Hence, the reflecting mirror of the invention advantageously has only four layers, as is illustrated in Figure 1 (*i.e.*, a reflecting film 14, an ion conducting film 20, a reduction coloring film 18 and a transparent electrode 16). By contrast, prior art electro-chromic-type mirrors included five layers, as illustrated in Figure 2 (*i.e.*, a reflecting film 56, a reduction coloring film 64, an ion conducting film 62, an oxidation coloring film 60 where hydrogen ions are released, and an electrode 58). As is set forth in the paragraphs bridging pages 3 and 4 of the present specification, prior art electro-chromic mirrors require five film forming processes in order to be manufactured, which therefore elevates the cost. Moreover, the transmittance of light is disadvantageously affected by the presence of five separate films that the light must traverse before being reflected. Thus, the overall transmittance of light is relatively low, and it is difficult to make a large contrast in the transmittances of light before and after the actuation of the electro-chromic layer. The present invention solves these problems with an electro-chromic mirror design that has fewer layers, and hence enhanced light transmissivity.

Amended claim 1 emphasizes that fact that the invention is directed toward an electro-chromic reflecting mirror where the reflecting layer stores the hydrogen ions. Claim

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1 recites a "reflecting mirror" that comprises a substrate through which light passes, a transparent electrode film, a reduction coloring film formed at a surface of the electrode film which may be colored "due to a reversible chemical reaction with hydrogen ions;" and

"an electrically conductive reflecting film which is formed at a surface of the reduction coloring film ... which reflects light at least at a substrate side surface, and which contains a hydrogen storing metal which stores hydrogen in an adsorbed state, ..."

Claim 1 ends by reciting that the

"... reflecting film reflects light regardless of whether said hydrogen storing metal releases or adsorbs said hydrogen ions."

None of the references of record discloses or remotely suggests a reflecting mirror recited in amended claim 1. In particular, all the Rauh '414 discloses is a light modulating device for transmitting light. To this end, this device includes a reflective layer 16 which

"is a ceramic, electro-chromic, crystalline film which is highly reflective (R is $\geq 50\%$) when injected with electrons and charged compensating ions ('colored state') and highly transmissive ($R > 10\%$) when these species are removed ('bleached state')." See column 3, lines 31-35

This device further includes a ceramic layer 18 capable of reversibly inserting an alkaline metal or hydrogen ions into layer 16 in response to an applied DC current (see column 3, lines 22-25). Layer 18 is described in column 5, lines 42-47 as "preferably substantially non-reflective when reduced ($R \geq 10\%$), ..."

Hence, neither the layer 16 nor the layer 18 of the Rauh '414 patent qualifies as the recited "electrically conductive reflective film" which is "highly reflective of light regardless of whether said hydrogen storing metal releases or adsorbs said hydrogen ions." For his reason alone, amended claim 1 is clearly patentable over the '414 patent. However, there is another reason as well. Claim 1 specifies that the electrically conductive reflecting film

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“contains a hydrogen storing metal which stores hydrogen in an adsorbed state, ...” By contrast, the Rauh ‘414 patent discloses that suitable materials for the layer 18 include various oxides of metals (see the paragraph bridging columns 5 and 6). For all these reasons, amended claim 1 is clearly patentable over the Rauh ‘414 patent.

Amended claim 1 is further patentable over the Ohno ‘296 patent, albeit for different reasons. This patent is concerned merely with a control device for an anti-glare mirror. No details are provided with respect to the structure of the mirror controlled; instead, this reference only generally describes prior art anti-glare mirror structures in column 1, lines 10-55. In short, as this reference neither discloses or suggests a reflecting mirror having the four specifically recited layers in amended claim 1, claim 1 is clearly patentable over the Ohno ‘296 patent, taken singly.

Nor is amended claim 1 rendered “obvious” in view of any tenable combination of the Rauh ‘414 and Ohno ‘296 patents. Neither of these patents discloses or remotely suggests the specifically recited “electrically conductive reflecting film ... which reflects light at least at a substrate side surface, and which contains a hydrogen storing metal that stores hydrogen in an adsorbed state, ... wherein said reflecting film is highly reflective of light regardless of whether said hydrogen storing metal releases or adsorbs said hydrogen ions.” Accordingly, amended claim 1 is patentable over any tenable combination of these references.

As the balance of the claims 2-10 are dependent upon amended claim 1, each of these claims is likewise patentable at least for the reasons given with respect to amended claim 1.

Now that all the claims are believed to be patentable, the prompt issuance of a Notice of Allowance and Issue Fee Due is hereby earnestly solicited.

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The Commissioner is authorized to charge any overage or shortage of fees connected with filing of this Amendment to Deposit Account No. 19-2380 (740165-362).

Respectfully submitted,



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